



Jahangirnagar University
Department of Computer Science and Engineering
3rd Year 2nd Semester B.Sc. (Hons.) Final Examination - 2021

Course Title: Microprocessors
Time: 3 Hrs.

Course No: **CSE-357**
Full Marks: **60**

[Answer each of the following questions. Each question carries equal marks. Figures in the right margin indicate marks.]

✓ Answer all questions:

- a) What is a microprocessor? What are the functions of a CPU? 2
- b) Mention the relative advantages and disadvantages of a high level and assembly language. 2
- c) State the differences between RISC and CISC microprocessors. 2
- d) Mention some properties of INTEL 8086 microprocessor. 2
- e) If $[DS] = 205FH$ and $OFFSET = 0051H$, what is the physical address? Does the EU or BIU compute this physical address? ~~X~~ 2
- f) What is the difference between an Intel Core i5 and Core i7? 2

2. Answer **Any Three** out of **Four** questions:

- a) Draw the internal architecture of INTEL 8086 microprocessor and mention the purpose of BIU and EU. 4
- b) What is the relationship between the 8086 and 8284 input clocks? Does the 8086 have an on-chip clock circuitry? Comments. 4
- c) Draw the pin assignment diagram of the INTEL 8086 microprocessor when it works in maximum mode and give a truth table of pin number 26, 27, and 28. 4
- d) Construct a $(4K \times 8)$ RAM using $(4K \times 1)$ RAM chips. ~~X~~ 4

3. Answer **Any Three** out of **Four** questions:

- a) Why is it necessary at the start of an interrupt service procedure to PUSH all registers used in the procedure and to POP them at the end of the procedure? 4
- b) Explain with figure how data can be transferred between main memory and an external I/O device using DMA controller. 4
- c) Draw the READ and WRITE cycle timing diagram of a typical semiconductor memory with different parameters. 4
- d) Briefly describe synchronous and asynchronous serial communication. 4

60

4. Answer **Any Three** out of **Four** questions:

- Point out some features of Pentium processors. 4
- Show the internal architecture of INTEL 80286 microprocessor. 4
- Explain with necessary figure how the INTEL 80286 microprocessor translates logical address to physical address. 4
- Construct a typical interface circuit to interface an 8x8 keypad and 8-digit display with 8279 IC. 4
- Explain the modes of operation determined by bits 7 and 6 of IC 8237 channel's mode register. 4

5. Answer **Any Two** out of **Three** questions:

a) Determine the effect of each one of the following 8086 instructions: 6

- PUSH [BX] [DS]
- DIV DH [AX] [DX]
- CWD
- MOVSB

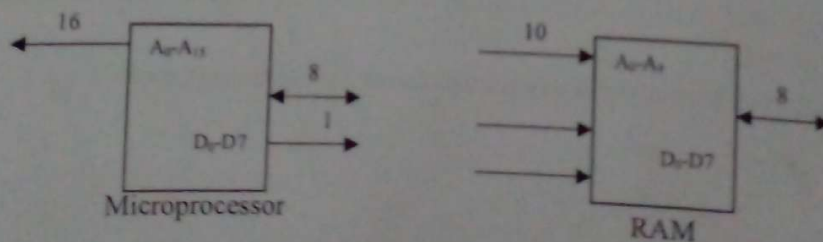
Assume the following data prior to execution of each one of the above instructions independently. Assume all numbers in hexadecimal.

[DS] = 3000H ✓ [SI] = 0400H
 [ES] = 5000H [DI] = 0500H
 [DX] = 0400H DF = 1
 [SP] = 5000H [BX] = 6000H ✓
 [SS] = 6000H
 [AX] = 00A9H
 [36000H] = 02H, [36001H] = 03H
 [50500H] = 05H
 [30400H] = 02H, [30401] = 03H

b) Write down the assembly language statements which will perform the following operations: 6

- Load the number 7986H into the BP register.
- Copy the BP register contents to the SP register.
- Copy the contents of the AX register to the DS register.

c) Assume the following microprocessor and the RAM chip. Draw a neat logic diagram showing connections between the microprocessor and RAM chip(s) to obtain a memory of 6KB and analyze the memory map. Use linear decoding technique. 6





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Course Title: Human-Computer Interaction
Time: 3.00 hours

Course No: **CSE-353**
Full Marks: **60**

[Answer each of the following questions. Each question carries equal marks. Figures in the right margin indicate marks.]

1. Question No. 1 will be based on **CO1**. Answer **All of them**.

- a) What is Human-Computer Interaction (HCI)? Explain its importance. 2
- b) Design the key terms of interaction design basics. 2
- c) Mention the required functions of designing a frontal lobe. 2
- d) State some matrices of International Standard Organization (ISO) usability standard 9241. 2
- e) Define errors and mental models. 2
- f) Why is it good practice to use standards and guidelines when designing interfaces? 2

2. Question No. 2 will be based on **CO2**. This question will be consisting of **Four** Sections.
Answer **Any Three** out of **Four**.

- a) Describe the lobes of the human brain, grey matter and white matter. 4
- b) Discuss the process of design. 4
- c) Mention seven stages of Donald Normans' Model of interaction and classify them into goal, execution and evaluation. 4
- d) Explain the experimental evaluation process with the help of experimental factors and variables. 4

3.

Question No. 3 will be based on **CO3**. Answer **Any Three** out of **Four**.

- a) Explain the laboratory studies and field studies for the evaluation process through user participation. 4
- b) Discuss requirement specification, architectural design, and design activities of the software development life cycle. 4
- c) Describe five types of cognitive process explaining how they can result in human error when using a computer system. 4
Describe the type of design rule
- d) Discover the problems a user may face with cognitive impairments and learning difficulties, and write the steps to be considered to defend those impairments. 4

Question No. 4 will be based on **CO4**. Answer **Any Three** out of **Four**.

- 4. a) Identify three evaluation techniques which would be appropriate for evaluating the interface of an air traffic control. 4
- b) Describe the Shneiderman's 8 Golden Rules and Norman's 7 Principles. 4
- c) Explain the physiological methods of eye tracking and physiological measurement. 4
- d) Illustrate the guidelines for design rules and Virtual Reality (VR). 4

Question No. 5 will be based on **CO5**. Answer **Any Two** out of **Three**.

- 5. a) Critically evaluate the utility of the heuristic evaluation approach when the heuristic evaluation is a popular technique for the measuring the general usability of an interface. 6
- b) Describe 5 (five) types of cognitive process explaining how they can result in human error when using a computer system. 6
- c)
 - i. Describe GOMS techniques with an example for CLOSE WINDOW. 3
 - ii. Discuss KLM to provide rough measures of user performance in terms of execution times for basic sequence of actions. 3

Swift

[Answer each of the following questions. Each question carries equal marks. Figures in the right margin indicate marks.]

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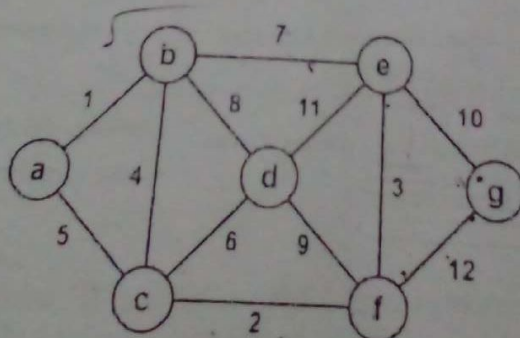
Question No. 1 based on **CO1**. Answer all of them.

- a) Draw the postal mail service under layered architecture model of computer network. 2
- b) If the subnet mask 255.255.192.0 is used for a class B IP address then find the number of subnets and number of hosts per subnet. 2
- c) Which layer under OSI is responsible for image and video compression? Mention with example. 2
- d) Mention the best and worst cases of byte and bit stuffing technique in formation of data frame. 2
- e) What is the difference between interaction of 'end to end nodes' under transport and network layer? 2
- f) Compare ARQ and FEC. 2

Question No. 2 based on **CO2**. Answer Any three out of four.

- a) (i) Clarify network 'applications' and 'application protocol' with example. 2
(ii) Segregate three parts of the URL: <http://www.cs.washington.edu/index.html>. Give the steps of webpage browsing using hyperlink. 2
- b) (i) Why web caching is used? Give the steps of web caching. 3
(ii) How 'QoS and performance management' is done under network management? 1
- c) (i) What will happen if a single DNS server is used worldwide? How DNS server are placed in real life? 2
(ii) What is the meaning of following two records in a DNS server? 2
www.ait.ac.th 86400 IN A 192.168.30.44
ait.ac.th 86400 IN MX zaman.ait.ac.th

d)



You are assigned to design the campus network for Jahangirnagar University. JU has seven building named as a.b....g. connection establishment cost from one building to another is given along with their edges. You have to select a set of lines that connects all the buildings with a minimum total cost. Explain step by step procedure.

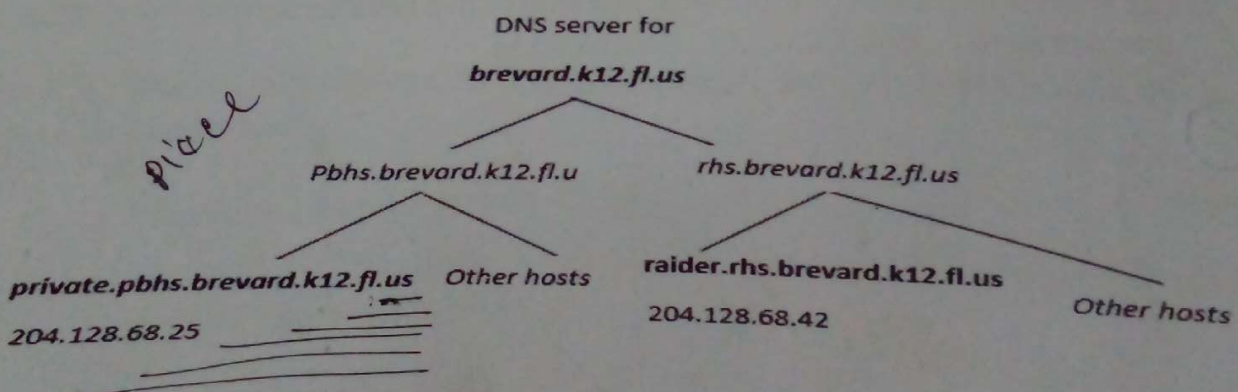
Question No. 3 is based on **CO3**. Answer **Any three** out of **four**.

- a) (i) How three-way handshaking protocol at transport layer tackles both old duplicate connection request and old duplicate data? 2
 (ii) What is the problem of asymmetric release? Draw the three-way handshaking of connection release at transport layer. 2
- b) Using the RSA public key cryptosystem, with $a = 26$, $b = 25 \dots y = 2z = 1$. 4
 - i. If $p = 5$ and $q = 13$, list five legal values for d .
 - ii. Using $p = 3$, $q = 11$, and $d = 9$. Calculate e and encrypt "ALOHA". 2
- c) (i) Why CSMA/CA is used in wireless network instead of CSMA/CD? 2
 (ii) Compare 1-persistent, non-persistent and p -persistent CSMA. 2
- d) (i) What is message digest? Why it is used in digital signature? 2
 (ii) How SHA-1 and RSA are combined in implementation of digital signature? 2

Question No. 4 is based on **CO4**. Answer **Any three**.

- a) Show that the throughput of pure and slotted ALOHA is: Ge^{-2G} and Ge^{-G} respectively. 4
 Derive maximum throughput for both cases. A pure ALOHA system uses 200 kbps channel and on an average each terminal generates frame of 500 bits, where each user on average transmits one frame on every 30 second. How many terminals the system can accommodate for slotted ALOHA case?
20 second *1000 bits* 1
- b) (i) What is jitter? How it can be avoided? 1
 (ii) The capacity of the token bucket $C = 500\text{KB}$, token arrival rate, $\rho = 2\text{MB/sec}$, the maximum drain rate, $M = 10\text{MB/sec}$ and the volume of the burst is 1MB . Determine (i) duration of maximum rate (ii) time required to maintain the token rate of 2MB/Sec . 3
- c) Give the steps of determining transmitted polynomial under CRC. An information source generates message bit string, $M = 10011011$ (8 bits); Generator bit string, $G = 10101$ (5 bits); i) Determine the polynomials: $R(x)$ and $T(x)$. 4

d) 4



- i. Let the host private.pbhs.brevard.k12.fl.us having IP address is 204.128.68.25 wants to connect the web server raider, which is in the rhs.brevard.k12.fl.us domain. Illustrate how the connection will be established.
- ii. Describe the above record under DNS: ecs.ju.edu 86400 IN CNAME cse.ju.edu

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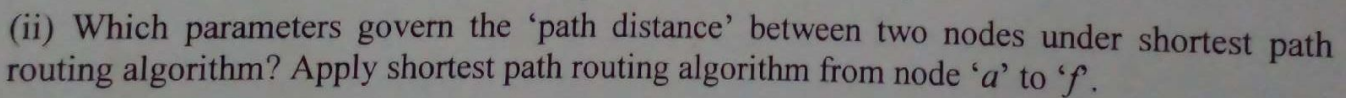
- a) i.



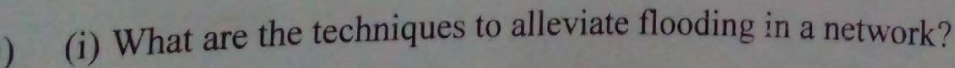
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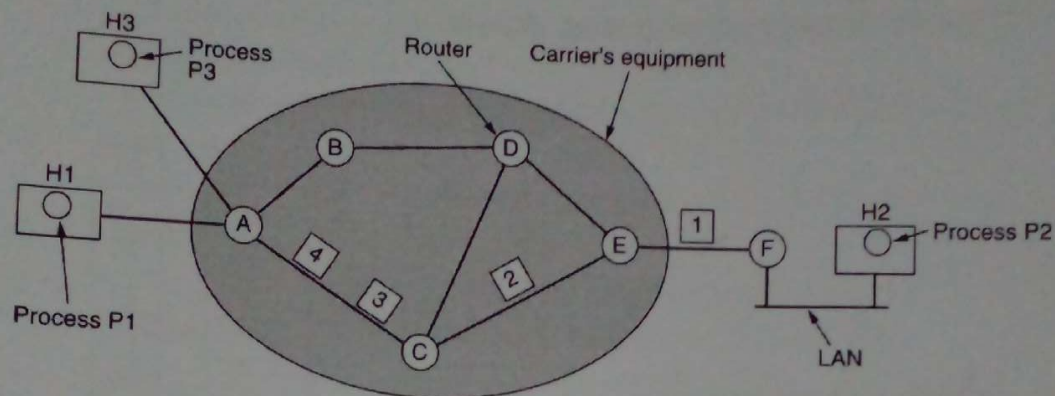
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4



(ii) Packets 1, 2, 3 and 4 follows the path A-C-E-F but next several packets follow the path A-B-D-E-F. Show the routing table of node A, B and D for latter case under **connection-oriented service**. Draw the routing table of node A and F for **connectionless service**.





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Course Title: Introduction to Bioinformatics
 Total Time: 3 Hours

Course Code: CSE 355
 Full Marks: 60

[Answer all the sections]

Q1.

Section-I (CO1): Answer all the questions.

- a. Give the concept of bioinformatics. 2
- b. Define phylogenetic tree. 2
- c. Outline the concept of biological database. List out some biological databases under different categories. 2
- d. Point out the relationship between PAM and BLOSUM scoring matrices. 2
- e. Write the differences between genetic code and codon. 2
- f. Define linear and affine gap penalty. 2

Q2.

Section-II (CO2): Answer any THREE out of FOUR.

- a. Explain central dogma of molecular biology. 4
- b. Differentiate global alignment of sequences from the local alignment. Explain how bioinformatics is different from conventional biology. 4
- c. Given four scoring matrices for sequence alignments: PAM1, PAM10, BLOSUM45 and BLOSUM90. Now,
 - i. Identify the matrices that should be used for the alignment of closely related protein sequences and evolutionarily divergent protein sequences. 1
 - ii. Express the meaning of PAM1 and BLOSUM 45. 2
 - iii. Discuss the way of computing PAM250. 1
- d. Given three sequences X, Y and Z as:

X	A	A	G	G	C	T	T
Y	A	A	G	G	C		
Z	A	A	G	G	C	A	T

সবটাই নয় X

- i. If $X = Y$ and $Y = Z$ in terms of identity distance measure, then estimate if $X = Z$? 2
- ii. Observe the relative mutability of A, G, C and T by considering only X and Z as sequences. 2

Q3.

Section-III (CO3): Answer any THREE out of Four.

- a. Calculate linear gap penalty and affine gap penalty from the following alignments: 4

t	a	c	g	t	g	-	-	a	g	g	t
t	a	c	a	t	g	c	t	a	g	g	t

$2+2+2+(-1)+2+2+5+1+2$
 Gap opening penalty = 5
 Gap extension penalty = 1
 $+2+3+2$

Substitution matrix

	a	c	g	t
a	2	-3	-1	-3
c	-3	2	-3	-1
g	-1	-3	2	-3
t	-3	-1	-3	2

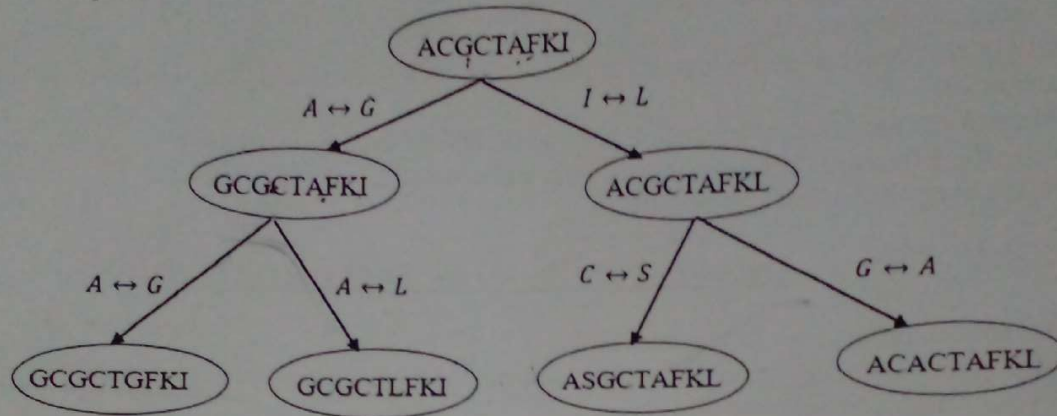
b. Given two partial DNA sequences (template strand) containing the gene to synthesize insulin protein: 4

Person-1 DNA sequence: TAC GGT GAA ACT

Person-2 DNA sequence: TAC GGC GAC ATT

- Transcribe person-2's DNA into mRNA in a single line.
- Demonstrate the translation of person-2's DNA into protein. [codon table is provided at the end of the question.]
- Can both person's DNA sequence make the same insulin protein despite the difference in their DNA sequence. If yes, point out the reasons.

c. Consider the following phylogenetic tree generated from the multiple sequence alignment of seven different sequences: 4



Discover the substitution score in the PAM matrix (partial) if A is replaced by G.

d. Given the evolutionary distances between five different taxa: Horse, Donkey, Chicken and Penguin as shown: 4

	Horse	Donkey	Chicken	Penguin
Horse	0	5	9	9
Donkey	5	0	10	10
Chicken	9	10	0	8
Penguin	9	10	8	0

Interpret the evolutionary relatedness between Horse & Penguin and Penguin & Donkey producing a phylogenetic tree using Neighbor Joining method.

Q4.

Section-IV (CO4): Answer any THREE out of FOUR.

a. Figure out the biological significant of gaps in the evolution and calculation of score in an alignment. 4

- b. Given a part of protein sequences of six different organisms is given as:

4

Sequence	Amino Acids			
S ₁	P	R	P	R
S ₂	R	R	R	M
S ₃	R	R	M	M
S ₄	R	R	P	R
S ₅	R	R	M	M
S ₆	R	R	P	M

Construct a BLOSUM matrix.

- c. Write an algorithm for global alignment. Find out the relative mutability of each of the amino acids.

4

S₁ = AGLL

S₂ = AGAV

- d. Given two DNA sequences as follows:

X: GACTTAC
Y: CGTGAATTCAT

Gap penalty = -4

mismatch = -3
match = 5

Similarity matrix:

	A	C	G	T
A	5	-3	-3	-3
C	-3	5	-3	-3
G	-3	-3	5	-3
T	-3	-3	-3	5

Investigate the local alignment between X and Y using Smith-Waterman algorithm. If there is more than one alignment, show only one.

Q5.

Section-V (CO5): Answer any TWO out of THREE.

- a. Find the global alignment of the following sequences using Needleman-Wunch method.

6

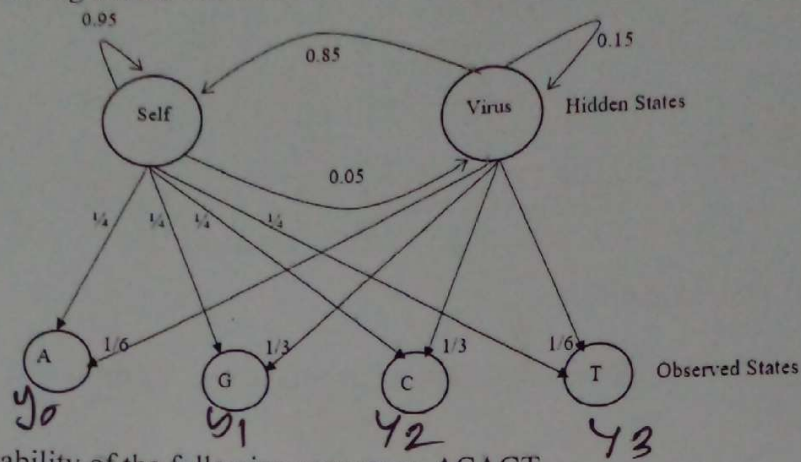
P = "AGCGTAG"

Q = "CTCGTC"

Considering matching score = 10, mismatching score = -5 and gap penalty = -7

A G C - - C T A G -
 C T C G - T - - C
 T T C A T

- b. Consider the following hidden Markov model:



Estimate the probability of the following sequence: ACAGT

- c. Consider the following evolutionary distance matrix between species A, B, C, D and E.

	B	C	D	E
A	0.31	1.01	.75	1.03
B	-	1.00	0.69	0.90
C	-	-	0.61	0.42
D	-	-	-	0.37

Conclude the relationship between these species from the phylogenetic tree produced by Fitch and Margoliash algorithm.

$$\begin{aligned} d_0 &= A \\ d_1 &= C \\ d_2 &= A \end{aligned}$$

..... Best Wishes.....

$$\begin{aligned} d_3 &= D \\ d_4 &= T \end{aligned}$$

Attachment

Codon Table

UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA } Stop UAG }	UGU } Cys UGC } UGA } Stop UGG } Trp
CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }
AUU } AUC } Ile AUA } AUG } Met	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }
GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }

BLOSUM62 Matrix

	C	S	T	A	G	P	D	E	Q	N	H	R	K	M	I	L	V	W	Y	F	
C	9																				C
S	-1	4																			S
T	-1	1	5																		T
A	0	1	0	4																	A
G	-3	0	-2	0	6																G
P	-3	-1	-1	-1	-2	7															P
D	-3	0	-1	-2	-1	-1	6														D
E	-4	0	-1	-1	-2	-1	2	5													E
Q	-3	0	-1	-1	-2	-1	0	2	5												Q
N	-3	1	0	-2	0	-2	1	0	0	6											N
H	-3	-1	-2	-2	-2	-2	-1	0	0	1	8										H
R	-3	-1	-1	-1	-2	-2	-2	0	1	0	0	5									R
K	-3	0	-1	-1	-2	-1	-1	1	1	0	-1	2	5								K
M	-1	-1	-1	-1	-3	-2	-3	-2	0	-2	-2	-1	-1	5							M
I	-1	-2	-1	-1	-4	-3	-3	-3	-3	-3	-3	-3	-3	1	4						I
L	-1	-2	-1	-1	-4	-3	-4	-3	-2	-3	-3	-2	-2	2	2	4					L
V	-1	-2	0	0	-3	-2	-3	-2	-2	-3	-3	-3	-2	1	3	1	4				V
W	-2	-3	-2	-3	-2	-4	-4	-3	-2	-4	-2	-3	-3	-1	-3	-2	-3	11			W
Y	-2	-2	-2	-2	-3	-3	-3	-2	-1	-2	2	-2	-2	-1	-1	-1	-1	2	7		Y
F	-2	-2	-2	-2	-3	-4	-3	-3	-3	-3	-1	-3	-3	0	0	0	-1	1	3	6	F
	C	S	T	A	G	P	D	E	Q	N	H	R	K	M	I	L	V	W	Y	F	



Jahangirnagar University
Department of Computer Science and Engineering
3rd Year 2nd Semester B.Sc. (Hons.) Final Examination - 2021

Course Title: Management and Accounting
Time: 3 hours

Course No: CSE-351
Full Marks: 60

[All questions are of equal value. Answer any Four (4) questions. All parts of each question must be answered consecutively. Figures in the right margin indicate marks of a question.]

1. a) Four financial statements are prepared from the summarized accounting data; what are these statements? Write down them in short. 5
 - b) State the accounting equation, and define assets, liabilities, and Owner's equity. What items affect the Owner's equity? 5
 - c) What do you mean by Monetary unit and Economic unit assumption? 3
 - d) Is there any difference between Accounting and Bookkeeping? If yes, show the differences. 2
-
2. a) Bob Sample opened the Campus Laundromat on September 1, 2017. During the first month of operations, the following transactions occurred.
 - i. Bob invested \$20,000 cash in the business.
 - ii. The company paid \$1,000 cash for store rent for September.
 - iii. Purchased washers and dryers for \$25,000, paying \$10,000 in cash and signing a \$15,000, 6 month, and 12% note payable.
 - iv. Paid \$1,200 for a one-year accident insurance policy.
 - v. Received a bill from the Daily News for online advertising of the opening of the Laundromat \$200.
 - vi. Bob withdrew \$700 cash for personal use.
 - vii. The company determined that cash receipts for laundry services for the month were \$6,200

Instructions: 2.1) Journalize the September transactions.

2.2) Open ledger accounts and post the September transactions.

2.3) Prepare a trial balance at September 30, 2017.

3. a) What do you mean by accounting? Identify and describe the steps in the accounting process. 5
- b) On April 1, Julie Spengel established Spengel's Travel Agency. The following transactions were completed during the month.
- i. Invested \$15,000 cash to start the agency.
 - ii. Paid \$600 cash for April office rent.
 - iii. Purchase equipment for \$3,000 cash.
 - iv. Incurred \$700 of advertising costs in the Chicago Tribune, on account.
 - v. Paid \$900 cash for office supplies.
 - vi. ✓ Performed services worth \$10,000: \$3,000 cash is received from customers, and the balance of \$7,000 is billed to customers on account.
 - vii. Withdrew \$600 cash for personal use.
 - viii. Paid Chicago Tribune \$500 of the amount due in transaction.
 - ix. Paid employees' salaries \$2,500.
 - x. ✓ Received \$4,000 in cash from customers who have previously been billed in transaction.

Instructions: ~~3.1~~ 1) Show the effects of the transactions on the accounting equation. 4

~~3.2~~ 2) Prepare an income statement. 6

4. a) Are there any leadership theories available in the world? If yes, discuss the leadership theories. 10
- b) Briefly describe the characteristics of well-designed goals. 5
5. a) Who has given the 14 PRINCIPLES OF MANAGEMENT, and who is he? Describe the principles with pertinent examples? 10
- b) What is Span of Control? Describe the factors affecting the width of the Span of Control. 5
6. a) According to Mintzberg, managers play some roles, what are those roles? Discuss them in short. 10
- b) Describe the approaches to establishing goals. 5